DEC STD 119-1 Digital Product Safety - Design Criteria

DOCUMENT IDENTIFIER: A-DS-EL00119-01-0000 Rev K1, 15-Feb-1990

ABSTRACT: This standard defines the safety design criteria for all Digital products. It describes the role of Product Safety Engineers and defines Digital unique requirements for geopolitical areas, voltage and temperature test limits, ozone emissions, chemicals, incomplete product requirements and product recall information.

APPLICABILITY: This standard applies to all products sold by Digital. Some product areas such as software, furnishings or other market areas may not have applicable requirements within this document. However, general principles of safety stated within IEC 950, Safety of Information Technology Equipment Including Electrical Business Equipment shall apply.

STATUS: APPROVED 15-Feb-1990; use VTX SMC for current status.

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REVISION HISTORY:	Rev B,	04-Jan-1979	ECO Number 00001
	Rev C,	01-May-1980	ECO Number ML003
	Rev E,	18-Nov-1983	ECO Number AP004
	Rev F,	04-Apr-1985	ECO Number AP005
	Rev H,	29-May-1987	ECO Number LJ006
	Rev J,	25-Aug-1988	ECO Number CTS07
	Rev K,	17-Nov-1989	ECO Number CTS08
	Rev K1,	15-Feb-1990	ECO Number CTS09

Document Management Category: Product Safety (HRS)
Responsible Department: Corporate Product Safety and Regulations
Responsible Person: Robert E. Johnson

APPROVAL: This document has been reviewed and recommended for approval by the DEC STD 119 Committee and the general review group for its category. Rev K1 incorporates clerical changes only.

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CONTENTS

1 INTRODUCTION 1
1.1 PURPOSE 1
1.2 SCOPE 1

2 IMPLEMENTATION 1

3 REQUIREMENTS 2

4 DIGITAL UNIQUE REQUIREMENTS 3
4.1 TECHNICAL EVALUATIONS BY PRODUCT SAFETY ENGINEERS 3
4.2 SPECIAL GEOPOLITICAL AREAS 3
4.3 TEMPERATURE TEST LIMITS 3
4.4 VOLTAGE TEST LIMITS 3
4.5 X-RADIATION EMISSION 3
4.6 OZONE EMISSION 4
4.7 CHEMICALS 4
4.8 INCOMPLETE PRODUCTS 4
4.9 PRODUCT RECALL INFORMATION 5

5 DIGITAL INTERPRETATION NOTES ON EXISTING IEC 950 CLAUSES 5
5.1 Clause 1.3.1 - Lithium and Similar Batteries 5
5.2 Clause 1.7 - Marking and Instructions 5
5.3 Clause 1.7.2 - Service Access Hazards 5
5.4 Clause 1.7.14 - Languages 5
5.5 Clause 2.1.2 - NEMA Receptacles 5
5.6 Clause 2.6.12 - Bulk Battery Supplies 5
5.7 Clause 2.7 - T-Slot Receptacles 6
5.8 Clause 2.7.3 - Neutral Harmonic Currents 6
5.9 Clause 2.8.4 6
5.10 Clause 3.1.1 - Aluminum Wire, Insulation Compression 6
5.11 Clause 3.1.3 - Equipment Orientation 6
5.12 Clause 4.1.1 - Stands, Stacking 6
5.13 Clause 4.1.2 - Chassis Slides, Springs 6
5.14 Clause 4.2 - Vibration, Shock 7
5.15 Clause 4.3.4 - Insulation Chemical Damage 7
5.16 Clause 4.4.3 - Negligible or Excess Fuel 7
5.17 Clause 5.2.5 - Leakage Current 7

6 AGENCY APPROVAL FOR COMPONENTS 8

Appendix A REFERENCED DOCUMENTS 9

A.1 EL-Class Digital Documents 9

A.2 Other Documents 9

A.3 Ordering Information 10

INDEX

TABLES

1 Component Approval Table 8

1 INTRODUCTION

1.1 PURPOSE

This standard defines safety design criteria to be applied to all Digital products. It describes the role of Product Safety Engineers and defines Digital-unique requirements for geopolitical areas, voltage and temperature test limits, ozone emissions, chemicals, incomplete product requirements and product recall information.

1.2 SCOPE

This standard applies to Digital products as indicated in *DEC STD 119-0 Digital Product Safety - Introduction and General Requirements* to the extent of the scope of the standards referenced under heading 1.3, Requirements.

2 IMPLEMENTATION

Products entering design shall be designed to comply with the requirements in this standard. Refer to the basic requirements within UL 1950, *Safety of Information Technology Equipment Including Electrical Business Equipment* and other supporting documents listed under heading 3. UL 1950 contains the complete text of IEC 950, *Safety of Information Technology Equipment Including Electrical Business Equipment* requirements plus the U.S. deviations. See heading 5 for Digital's interpretation of existing IEC 950 clauses.

Products completing design shall be reviewed against these standards and any deficiencies shall be noted in the product safety report. Any shortcomings must be corrected to bring them into compliance with these standards by March 15, 1992. The Product Business Unit (PBU) determines whether it is more cost effective to:

a. Redesign the product before release

b. Release the product and begin redesign later to comply with the upgrade by March 15 1992, or

c. Release the product, and plan to retire or replace it by March 15, 1992

Products already released shall undergo a product safety design review in order to assure compliance with these standards. Upgrade or retirement of these products by March 15, 1992 is mandatory.

During the interim period, compliance with DEC STD 119-01, Rev J is acceptable. DEC STD 119 Rev J is based on IEC 435, *Safety Requirements for Data Processing Equipment*, IEC 380, *Safety of Electrically-Energized Office Machines*, CSA C22.2 220, *Safety Functions Incorporating Electronic Technology*, UL 478, *Information Processing and Business Equipment*, and others that will soon be obsolete, and therefore invalid for product approvals or outside agency listings.

3 REQUIREMENTS

Digital products shall be designed to comply with the following standards:

a. IEC 950, *Safety of Information Technology Equipment Including Electrical Business Electrical Equipment; First Edition - 1986 and Amendment No. 1, 1988*

b. UL 1950, *Safety of Information Technology Equipment Including Electrical Business Equipment; First Edition - March 1989*

c. CSA C22.2 No. 950 - M1989 *Safety of Information Technology Equipment Including Electrical Business Equipment*

d. EN 60 950, *European Standard Safety of Information Technology Equipment including Electrical Business Equipment; First Edition, June 1988* (IEC 950 First Edition - 1986, modified and does not include Amendment No. 1 of IEC 950)

e. AS 3260-1988, *Safety of Information Technology Equipment Including Electrical Business Equipment*

f. SS 436 14 50, *Swedish Electrical Safety Standard for Information Handling and Business Equipment*

g. VDE 0805, *Safety of Information Technology Equipment Including Electrically Operated Business Equipment*

NOTE

A compilation of the applicable standards was not done for Revision K for the following reasons:

- **The direct reference to the applicable standards is more useful for national standards compliance purposes.**
- **It is important to publish this revision without the delay of developing an extensive version.**
- **The standards referenced are all derivations of IEC 950 and most have a synopsis of the deviations to IEC 950.**
- **A merged document is being prepared to be offered as a handbook in the future.**

Products that are made in whole or in part of fabric or related material must be in compliance with the U.S. 16 CFR, Subchapter D, *Flammable Fabrics Act*.

Equipment that produces ionizing or laser radiation must comply with:

- U.S. 21 CFR, Subchapter J, *Radiological Health*
- IEC 825, *Radiation Safety of Laser Products, Equipment Classification, Requirements and User's Guide*
- HD 482 S1, *Radiation Safety of Laser Products, Equipment Classification, Requirements and User's Guide*

Products shall be in compliance with ANSI C95.1-1982, *Safety Levels with Respect to Human Exposure to Radio Frequency Electromagnetic Fields, 300 KHz to 100 GHz*.

4 DIGITAL UNIQUE REQUIREMENTS

The following shall be imposed in addition to the requirements listed under heading 3.

4.1 TECHNICAL EVALUATIONS BY PRODUCT SAFETY ENGINEERS

Design methods that provide equivalent levels of safety may be permitted by the use of the waiver process with consideration of applicable laws, legally mandated standards, the needs of external approval agencies, and input from the Product Safety Engineer.

Conversely, if in the judgment of the Product Safety Engineer, there are situations not adequately covered by this standard, additional conditions may be imposed on the product.

4.2 SPECIAL GEOPOLITICAL AREAS

Products delivered only to specific geographic or national areas may be designed and built to that subset of the above standards applying to the specific set of countries. Such a condition shall be documented in the product design specification and in the product safety documentation. Under these circumstances, each deficiency to the complete list of standards shall be documented in the product safety report.

There are national deviation notes to IEC 950 and EN 60 950 that are general requirements unless specifically addressed by the preceding paragraph.

4.3 TEMPERATURE TEST LIMITS

IEC 950 requires correction of the temperature tables based on the advertised or recommended operating conditions. This information as provided in *DEC STD 102-0 Environmental Standard for Computers and Peripherals - General Test Requirements* for Class A, B, and C equipment and has been included in the revised test procedures in *DEC STD 119-2 Digital Product Safety - Test Methods*.

4.4 VOLTAGE TEST LIMITS

The test voltages must be corrected based on *DEC STD 122-0 AC Power Line Standard: Design Requirements and Guidelines*. These appear in the revised test procedures in DEC STD 119-2.

NOTE

These voltages have been reduced from the design range to the operating range figures from DEC STD 122-0. Originally, the more stringent design voltage range was specified.

4.5 X-RADIATION EMISSION

Equipment that produces ionizing radiation shall emit no more than 2 microsieverts/hour (0.2 milliroentgens/hour) under the conditions of UL 1950, Appendix H *Ionizing Radiation*

For products containing cathode ray tubes (CRTs), the following data shall appear in the related technical manual (anode voltage and dose rate data shall be those for the specific product).

Rated Anode Voltage: XX kV

Dose rate: Less than XX picoamperes per kilogram (XX mR/hr) measured at a distance of 5 cm at any accessible point of the external surface.

Complies with:

- IEC 950, Appendix H *Ionizing Radiation*
- UL 1950, Appendix H *Ionizing Radiation*
- CSA Z65, *Radiation Hazards From Electrical Equipment*
- Bundesgestzbl. 1 S 173 Section 05 clause 2 *German X-Ray Ordinance*

Workstation exposure: Does not expose the operator to dangerous X-Ray radiation.

4.6 OZONE EMISSION

Equipment that produces ozone shall result in no more than the following concentrations when tested in accordance with 119-TM-E11.

When run at a continuous rate:

A unit shall not exceed a permissible exposure limit (PEL) over 8 hours above background in excess of 0.1 parts per million over an 8-hour period nor a short term exposure level (STEL) of more then 0.3 parts per million over a 10-minute period. The concentration at STEL limits shall not occur more frequently than four times in eight hours.

When run at a rate of three times the field service contract rate:

A unit shall not exceed a permissible exposure limit (PEL) over 8 hours above background in excess of 0.05 parts per million over an 8-hour period nor a short term exposure level (STEL) of more then 0.15 parts per million over a 10-minute period. The concentration at STEL limits shall not occur more frequently than four times in eight hours.

4.7 CHEMICALS

All chemicals designed for use with home computers, personal computers, terminals, or other desktop uses shall be considered as household products for the purposes of complying with U.S. 16 CFR, Subchapter E, *Poison Prevention Packaging Act*. Refer to *DEC STD 136-3 The Introduction and Review Process for Digital Chemical Products* for more information.

4.8 INCOMPLETE PRODUCTS

Products not complete and suitable for use as sold must be provided with a listing of any additional conditions required to create a safe product. Some products sold by digital are not complete with regard to safety requirements. Examples are empty cabinets, power controllers, open frame power supplies and rack mount equipment. These products need further provisions before being ready for safe use as a final product.

For example, rack mount assemblies need to address the problems of leakage current, total current consumption, stability, and temperature rise. Other products may need completion of the enclosure or special building construction, such as for example automated teller machines. These products should be provided with instructions and technical data needed for proper application of the product, such as leakage current.

4.9 PRODUCT RECALL INFORMATION

Recall information is required on all shipments of products. Prior to shipment, the Product Safety Engineer shall ensure that the necessary manufacturing processes for recording and entering recall information are implemented for the products. Contact Corporate Customer Services Product Safety for further information. Special attention is focused on:

a. All products containing lasers

b. All consumer products subject to Consumer Product Safety Commission (CPSC) regulations (USA)

5 DIGITAL INTERPRETATION NOTES ON EXISTING IEC 950 CLAUSES

5.1 Clause 1.3.1 - Lithium and Similar Batteries

Failure of any product to comply with clause 4.3.24 from UL 1950 will be taken as failure to comply with this clause.

5.2 Clause 1.7 - Marking and Instructions

The markings within the reference standards can be found in *DEC STD 178-1 Digital Marking Requirements for Piece Parts Intended to be Sold*, *DEC STD 178-2 Digital marking requirements for Subassemblies: Field Replaceable Units (FRU) and Non-Field Replaceable Units*, *DEC STD 178-3 Digital Marking Requirements for Completed Products Intended to be Sold*, *DEC STD 178-5 Marking Symbology*, and *DEC STD 178-7 Translations*.

All product manuals must be reviewed to ensure that they comply with the requirements of the standards listed under heading 3, *Requirements* and cover any special national considerations.

5.3 Clause 1.7.2 - Service Access Hazards

Hazards in service access areas must be clearly marked if not adequately covered during normal servicing. Note that covers may be required by clause 2.1.4.

5.4 Clause 1.7.14 - Languages

The acceptable languages are to be derived from *DEC STD 064-0 Compliance With International language Requirements* as matched against the geographic requirements.

5.5 Clause 2.1.2 - NEMA Receptacles

NEMA receptacles are not acceptable for use outside North America unless pins are protected from access with the test finger during disconnection (for example, with a sleeve).

5.6 Clause 2.6.12 - Bulk Battery Supplies

Hazardous battery circuits should be considered as subject to clause 2.6.12.

5.7 Clause 2.7 - T-Slot Receptacles

NEMA 5-20R or 6-20R "T-slot" receptacles are not acceptable for use in Canada.

5.8 Clause 2.7.3 - Neutral Harmonic Currents

If the neutral current is greater than any phase current or if the neutral conductor is smaller than the phase conductors, overcurrent protection in the neutral conductor would be needed to meet the requirements of this clause. Refer to clause 2.7.1 in EN 60 950, *Safety of Information Technology Equipment Including Electrical Business Equipment* regarding protection location.

5.9 Clause 2.8.4

CSA C22.2 0.8 *Safety Functions Incorporating Electronic Technology*, UL 224A, *Solid-State Controls for Appliances*, and UL 991, *Tests for Safety Related Controls Employing Solid-State Devices* should be used as a procedure to prove adequate investigation of complex interlock systems.

5.10 Clause 3.1.1 - Aluminum Wire, Insulation Compression

Special attention must be given to the use of aluminum wire with regard to its thermal expansion and corrosion problems. Connectors approved for the purpose will generally be required.

Terminals involving compressible insulation such as printed-wiring boards have been found to be unreliable if they do not involve provisions to maintain compression.

5.11 Clause 3.1.3 - Equipment Orientation

Check for strain on the cord or connector by use of the machine in other expected operating positions, such as edgewise.

5.12 Clause 4.1.1 - Stands, Stacking

Units designed or likely to be stacked or placed on a stand without being fixed together might be considered unstable enough to become a hazard. The Product Safety Engineer shall specify the degree of misalignment to be reasonably foreseen as part of the test criteria.

5.13 Clause 4.1.2 - Chassis Slides, Springs

Past history with chassis slides indicates the need for careful review of the design and strength of chassis slides, particularly with regard to safety stops.

Failure of springs and gas springs shall be considered a likely fault condition as required by clause 1.3.1. A backup means of protection is needed if failure can create a hazard. Consideration needs to be given to simultaneous failures such as long term leaking of more than one gas spring.

5.14 Clause 4.2 - Vibration, Shock

Failure in an unsafe manner during the vibration and shock testing of DEC STD 102-0 may be evidence of failure to meet this clause.

5.15 Clause 4.3.4 - Insulation Chemical Damage

See notes for clause 3.1.1.

5.16 Clause 4.4.3 - Negligible or Excess Fuel

UL has accepted two cubic centimeters as the volume of a part which will contribute negligible fuel to a fire.

Extensive use of Class HB materials may not be accepted as a usage which minimizes the propagation of fire.

5.17 Clause 5.2.5 - Leakage Current

Note that UK wiring regulations require redundant grounding of systems with over 10 mA leakage current.

6 AGENCY APPROVAL FOR COMPONENTS

The following components will need agency approvals in order to get agency approval of the product containing them. Additional component approvals of parts not on this list may be required. Any questions should be discussed with the Product Safety Engineer.

Table 1: Component Approval Table

UL	CSA	IEC/VDE	
x			air filters
		x	capacitors
x	x	x	CRTs
x	x	x	circuit breakers
x			conductive coatings
x	x		connectors
x	x	x	direct plug in transformers and power supplies
x	x		fans above 30 V RMS
x	x		fiber optic cable
x	x	x	fuses and fuseholders(and SEMCO approval)
x	x	x	interlock switches
x	x	x	line filters
x			lithium batteries
x	x	x	mains connectors
x			plastics (the resin)
x	x	x	power cords and cord sets
x	x	x	power (mains) connectors
x	x	x	power supplies
x	x	x	primary circuit motors
x			printed wiring boards
x	x	x	relays in hazardous or safety circuits
x	x	x	strain reliefs (or application approved)
x	x	x	subassemblies or products using primary power
x	x	x	switches in hazardous or safety circuits
x			transient voltage surge suppressers
x	x	x	thermal controls
x	x		varistors
x	x		wire and cable
x			wiring harnesses

APPENDIX A REFERENCED DOCUMENTS

A.1 EL-Class Digital Documents

EL-Class Number	Document Title
EL-00064-00	*DEC STD 064-0 Compliance with International Language Requirements*
EL-00102-00	*DEC STD 102-0 Environmental Standard for Computers and Peripherals - General Test Requirements*
EL-00119-00	*DEC STD 119-0 Digital Product Safety - Introduction and General Requirements*
EL-00119-02	*DEC STD 119-2 Digital Product Safety - Test Procedures*
EL-00122-00	*DEC STD 122-0 AC Power Line Standard: Design Requirements and Guidelines*
EL-00136-03	*DEC STD 136-3 The Introductory and Review Processes for Digital Chemical Products*
EL-00176-00	*DEC STD 176-0 Printed-Wiring Board Acceptance Criteria*
EL-00178-01	*DEC STD 178-1 Digital Marking Requirements for Piece Parts*
EL-00178-02	*DEC STD 178-2 Digital Marking Requirements for Subassemblies: Field Replaceable Units (FRU) and Non-Field Replaceable Units*
EL-00178-03	*DEC STD 178-3 Digital Marking Requirements for Completed Products Intended to Be Sold*
EL-00178-05	*DEC STD 178-5 Marking Symbology*
EL-00178-07	*DEC STD 178-7 Translations*

Use VTX SMC to order copies of EL-class documents from Standards and Methods Control. Send distribution questions to JOKUR::SMC or call DTN: 234-4423.

A.2 Other Documents

Document Number	Document Title
16 CFR, SUBCHAPTER D	*Flammable Fabrics Act*
16 CFR, SUBCHAPTER E	*Poison Prevention Packaging Act*
21 CFR, SUBCHAPTER J	*Radiological Health*
ANSI C95.1	*Safety Levels with Respect to Human Exposure to radio Frequency Electromagnetic Fields, 300 KHz to 100 GHz*
AS 3260	*Safety of Information Technology Equipment Including Electrical Business Equipment*
BUNDESGESETZBL.1S173	*German X-ray Ordinance, Section 05 Clause 2; Verordnung uber den Schutz vor Schaden durch Rongenstrahlen*
CSA C22.2 NO. 0.8	*Safety Functions Incorporating Electronic Technology*
CSA C22.2 NO. 220	*Information Processing and Business Equipment*
CSA C22.2 NO. 950	*Safety of Information Technology Equipment Including Electrical Business Equipment*
CSA Z65	*Radiation Hazards From Electrical Equipment*

Document Number	Document Title
EN 60 950	*Safety of Information Technology Equipment Including Electrical Business Equipment*
HD 482 S1	*Radiation Safety of Laser Products, Equipment Classification, Requirements and User's Guide*
IEC 380	*Safety of Electrically-Energized Office Machines*
IEC 435	*Safety requirements for Data Processing Equipment*
IEC 825	*Radiation Safety of Laser Products, Equipment Classifiction, Requirements and User's Guide*
IEC 950	*Safety of Information Technology Equipment Including Electrical Business Equipment*
SS 436 14 50	*Swedish Electrical Safety Standard for Information Handling and Business Equipment*
UL 1950	*Safety of Informtion Technology Equipment Including Electrical Business Equipment*
UL 244A	*Solid-State Controls for Appliances*
UL 478	*Information Processing and business Equipment*
UL 991	*Tests for Safety Related Controls Employing Solid-State Devices*
VDE 0805	*Safety of Information Technology Equipment Including Electrically Operated Business Equipment*

A.3 Ordering Information

Following are the sources for documents not available from Standards and Methods Control.

- UL 1950, *Safety of Information Technology equipment Including Electrical Business Equipment* may be ordered from Standards and Methods Control using VTX SMC. Use order number EL-EN711-00. Send distribution questions to JOKUR::SMC or call DTN: 234-4423.
- American National Standards Institute (ANSI),
  1430 Broadway, New York, NY 10018,
  Telephone (212) 354-3300 x479
- Canadian Standards Association (CSA), Standards Sales,
  178 Rexdale,
  Ontario, Canada M9W1R3,
  Telephone (416) 744-4044
- Underwriters Laboratories (UL), Publications Stock,
  33 Pfingsten Road, Northbrook, IL 60062
  Telephone (312) 272-8800, x2612 or x2622
- U.S. Goverment Printing Office
  Washington, D.C. 20402
- British Standards Institute,
  BSI Sales, Linford Wood,
  Milton Keynes, MK14 6LE, England
- Standards Association of Australia,
  Standards House,
  80 Arthur Street,
  North Sidney, NSW, Australia

INDEX

A

Agency Approval, 8
Air Filters, 8
Aluminum Wire, 6

B

Batteries
  Lithium (and similar), 5
Battery, 5
Bulk Battery Supplies, 5

C

CABINETS, 4
Capacitors, 8
Cathode Ray Tubes (CRTs), 3
Chassis Slides, 6
Chemicals, 4
Clause 1.3.1, 5
Clause 1.7.14, 5
Clause 1.7.2, 5
Clause 2.1.2 - NEMA Receptacles, 5
Clause 2.6.12 - Bulk Battery Supplies, 5
Clause 2.7.3 - Neutral Harmonic Currents, 6
Clause 2.7 - T-Slot Receptacles, 6
Clause 2.8.4 - Complex Interlocks, 6
Clause 3.1.1 - Aluminum Wire, Insulation Compression, 6
Clause 4.1.1 - Stands, Stacking, 6
Clause 4.1.2 - Chassis Slides, Springs, 6
Clause 4.2 - Vibration, Shock, 7
Clause 4.3.4 - Insulation Chemical Damage, 7
Clause 4.4.3 - Negligible or Excess Fuel, 7
Complex Interlocks, 6
Complex Interlock Systems, 6
Components
  Agency approval, 8
Connectors, 6
CONSUMER PRODUCTS, 5
CONSUMER PRODUCT SAFETY COMMISSION (CPSC), 5

E

Electomagnetic Fields, 2
Equipment Orientation, 6
Excess Fuel, 7

F

Fabric, 2
Fuel
  Excess, 7
  Negligible, 7

G

Gas Springs, 6
Geographic Areas, 3
Grounding, 7

I

INCOMPLETE PRODUCTS, 4
  CABINETS, 4
  POWER CONTROLLERS, 4
  POWER SUPPLIES, 4
  RACK MOUNT EQUIPMENT, 4
Insulation
  Chemical Damage, 7
  Compression, 6
Interlocks, 6

L

Languages, 5
Laser radiation, 2
LASERS, 5
Leakage Current, 7
Lithium and Similar Batteries, 5

M

Misalignment, 6

N

National Areas
Deviation notes, 3
Negligible Fuel, 7
NEMA Receptacles, 5
Neutral Current, 6
Neutral Harmonic Currents, 6

O

Overcurrent Protection, 6
Ozone, 4

P

POWER
CONTROLLERS, 4
SUPPLIES, 4
Printed-Wiring Boards
Compressible insulation, 6
PRODUCT RECALL INFORMATION, 5
Product Safety Engineers, 3
Judgment, 3
Special product situations, 3

R

RACK MOUNT EQUIPMENT, 4
Radiation
laser, 2
Radio Frequencies, 2
Receptacles, 6

S

Service Access Hazards, 5
Shock, 7
Springs, 6
Stability, 6
Stacking, 6
Stands, 6

T

Temperature Test Limits, 3
Terminals
Compressible insulation, 6
T-Slot Receptacles, 6

V

Vibration, 7
Voltage Test Limits, 3

W

Waiver Process, 3

X

X-Radiation, 3

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